

## **Engineering Design File**

Project No. 23512

# **INTEC Tank Farm Inadvertent Intruder Assessment**

**Idaho  
Cleanup  
Project**

The Idaho Cleanup Project is operated for the  
U.S. Department of Energy by CH2M ♦ WG Idaho, LLC

# ENGINEERING DESIGN FILE

EDF No.: 6803 EDF Rev. No.: 0 Project File No.: 23512

1. Title: INTEC Tank Farm Inadvertent Intruder Assessment				
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# INTEC Tank Farm Inadvertent Intruder Assessment

## 1. INTRODUCTION

The inadvertent intruder assessment is based on the assumption that exposure of a hypothetical inadvertent intruder at the Tank Farm involves acute (i.e., short-term) exposure during an assumed initial contact with radioactive waste while drilling an irrigation well. The acute drilling scenario assumes that an inadvertent intruder drills a large-diameter [56-cm (22 in.)] irrigation well directly into the CPP-31 soils area. The intruder is assumed to be exposed to contaminated drill cuttings brought to the surface and spread over the ground. The exposure pathways for this acute drilling scenario include external exposure to drill cuttings on the ground surface, inhalation of contaminated dust suspended in air, and ingestion of contaminated soil.

The intruder is exposed to the contaminated drill cuttings for 160 hours, the time to drill and develop the well. Drilling a 56-cm (22-in.) well through a contaminated soil layer of 12 m (40 ft) would move 3 m<sup>3</sup> (106 ft<sup>3</sup>), of contaminated soil to the surface. The total volume of cuttings brought to the surface by drilling a 56 cm (22 in.) diameter well to a depth of 142 m (466 ft) (depth to the water table below CPP-31 soils area) is 35 m<sup>3</sup> (1,236 ft<sup>3</sup>). The cuttings are spread over a 2,200 m<sup>2</sup> (24,000 ft<sup>2</sup>) area to an average depth of 0.016 m (0.05 ft). Inhalation of suspended drill cuttings was modeled using an atmospheric mass-loading factor of 1 mg/m<sup>3</sup> representative of construction activities (Maheras et al. 1997). Soil ingestion was modeled assuming an occupational ingestion rate of 50 mg/d for an 8-hour workday (EPA 1997). The intruder is assumed to ingest a total of 1,000 mg of contaminated soil during the 160 hrs (20 work-days) of exposure. The acute drilling scenario is illustrated in Figure 1. Intruder risks were calculated for the year 2095.

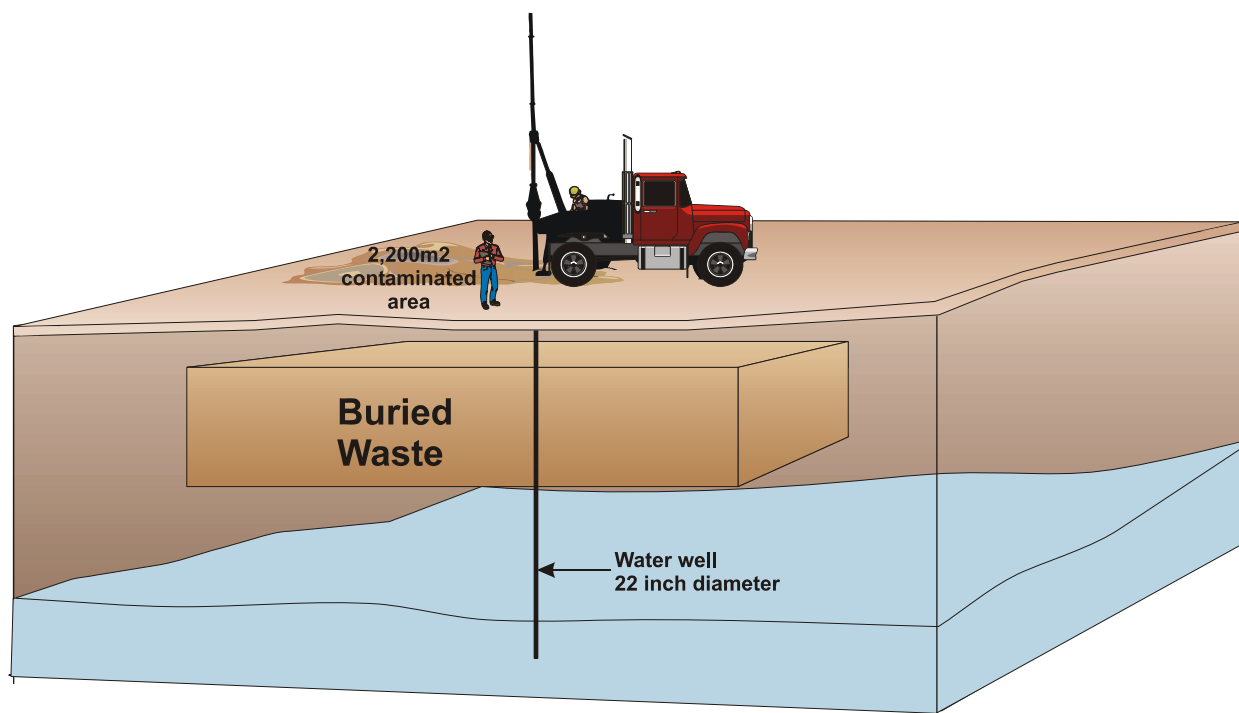


Figure 1. Graphical representation of the acute-drilling scenario.

The radionuclide soil activities in the drill cuttings were determined from the soil samples collected in 2004 (DOE-NE-ID 2005). Soil samples were taken from both 2 and 4 ft intervals over a 40 ft profile. The soil sample concentrations were averaged over this 40 ft profile by assigning a soil concentration every 2 ft by interpolating from soil samples taken above and below the 2 ft interval of interest or using the same soil concentration as the sampled 4 ft interval. The average soil concentration over the 40 ft profile was then decayed to the year 2095. The radionuclide activity is mixed with the drill cuttings brought to the surface. Changes in radionuclide concentrations over time are assumed to occur only by decay and subsequent ingrowth and decay of radioactive progeny (if any); no depletion due to leaching was assumed.

The RESRAD code Version 6.3 (Yu et al. 2001) was used to calculate the risk per unit concentration in the source at the time of exposure (including radioactive decay and ingrowth of progeny, as applicable), or risk-to-source ratio (*RSR* in risk/y per pCi/g) using the input parameters shown in Table 1. The RESRAD code was selected to calculate the risks from inadvertent intrusion into the contaminated soil because it has a recognized history of use for similar applications and specifically models the exposure of a receptor to buried waste via inhalation, external exposure, and soil ingestion. RESRAD keeps track of ingrowth of progeny and includes the progeny in the dose calculations. RESRAD also meets the software quality assurance requirements for analysis software at the INL.

Table 1. Input parameters used in acute intruder drilling scenario.

Parameter	Value	Comments
Soil concentration	1pCi/g	
Calculation Times	0, 1, 100 and 1000 yrs	
Contaminated Zone		
Area	2200 m <sup>2</sup>	
Thickness	0.016 m	Footnote a
Cover and Contaminated Zone Hydrology		
Cover depth	0 m	
Density of contaminated zone	1.5 g/cm <sup>3</sup>	Footnote b
Contaminated zone erosion rate	0 m/yr	
Average annual wind speed	3.35 m/s	Average INL value
Average annual precipitation	0.22 m	Average INL value
Occupancy, Ingestion, Inhalation, and External Gamma Data		
Soil Ingestion rate	54.65 g/yr	Footnote c
Inhalation rate	8400 m <sup>3</sup> /yr	Default
Mass loading for inhalation	0.001 g/m <sup>3</sup>	Maheras et al. 1997
Exposure duration	1 yr	
Shielding factor inhalation	0.4	Default
Shielding factor external gamma	0.7	Default

Table 1. (continued).

Parameter	Value	Comments
Indoor time fraction	0	
Outdoor time fraction	0.0183	160 hrs/yr (Maheras et al. 1997)
Shape of contaminated zone	Circular	
<p>a. The contaminated zone depth of 0.016 m is obtained by dividing the total volume of soil (35 m<sup>3</sup>) brought to the surface via a 22-in (0.5588 m) well drilled to depth of 142 m by the area (2,200 m<sup>2</sup>) the drill cuttings are spread over.</p> <p>b. Density of well drill cuttings and surface soil is 1.5 g/cm<sup>3</sup>.</p> <p>c. A total of 1000 mg of soil is assumed to be ingested (20 days (8 hr each) * 50 mg/d, assuming a total of 160 hours of exposure). A value of 54.65 g/yr was used as the soil ingestion rate in RESRAD, because 54.65 g/yr * 0.0183 yr<sup>-1</sup> (outdoor time fraction) = 1000 mg.</p>		

The risk (unitless) to a hypothetical inadvertent intruder is calculated as follows:

$$\text{Risk} = C_{s,i} (\text{RSR}) (V_w/V_T)$$

Where

$C_{s,i}$  = soil concentration of radionuclide i (pCi/g)

$\text{RSR}$  = risk-to-source ratio in *risk/y per pCi/g*

$V_w$  = contaminated soil volume brought to the surface (m<sup>3</sup>)

$V_T$  = total volume of soil brought to the surface (m<sup>3</sup>).

Table 2 presents the initial average radionuclide soil concentration over the 40 ft profile and the decayed radionuclide soil concentration in the year 2095. Table 3 presents the *RSRs* for each radionuclide by pathway. The RESRAD files are attached as Appendix A.

Table 2. Average soil concentrations over the 40 ft profile from samples collected and analyzed in 2004 and the average soil concentration decayed to the year 2095 (adapted from DOE-NE-ID 2005).

Radionuclide	Average Soil Concentration in 2004 (pCi/g)	Average Soil Concentration in 2095 (pCi/g)
Am-241	9.12E+02	7.88E+02
Cs-137	8.84E+05	1.10E+05
Eu-154	8.20E+02	6.33E-01
Np-237	2.00E+00	2.00E+00
Pu-238	4.29E+03	2.09E+03
Pu-239	8.76E+02	8.73E+02
Pu-240	8.76E+02	8.67E+02
Sr-90	2.60E+06	2.86E+05

Table 2. (continued).

Radionuclide	Average Soil Concentration in 2004 (pCi/g)	Average Soil Concentration in 2095 (pCi/g)
Tc-99	1.95E+01	1.95E+01
U-233	4.54E+01	4.54E+01
U-234	4.54E+01	4.54E+01
U-235	1.37E+01	1.37E+01
U-238	5.60E+00	5.60E+00

Table 3. The Risk-to-Source Ratios for each radionuclide by pathway.

Radionuclide	External RSR (Risk/y per pCi/g)	Inhalation RSR (Risk/y per pCi/g)	Soil Ingestion RSR (Risk/y per pCi/g)
Am-241	2.9E-10	6.3E-10	1.3E-10
Cs-137	1.0E-08	1.8E-12	3.6E-11
Eu-154	2.2E-08	3.4E-12	1.4E-11
Np-237	3.9E-09	4.8E-10	9.0E-11
Pu-238	1.0E-12	8.6E-10	1.7E-10
Pu-239	1.4E-12	9.1E-10	1.7E-10
Pu-240	1.0E-12	9.2E-10	1.7E-10
Sr-90	9.5E-11	7.1E-12	9.3E-11
Tc-99	7.0E-13	6.3E-13	3.9E-12
U-233	6.1E-12	4.7E-10	9.5E-11
U-234	2.3E-12	4.6E-10	9.4E-11
U-235	2.9E-09	4.2E-10	9.6E-11
U-238	5.2E-10	3.9E-10	1.2E-10

## 2. RESULTS

This section presents the risks to a hypothetical inadvertent intruder who drills an irrigation well into the CPP-31 soils area. The total risk to the inadvertent intruder as a result of this hypothetical scenario is 1E-04. External exposure to Cs-137 (Ba-137m) accounts for the majority of this risk with a risk of 9.6E-05. The next highest risk is from external exposure to Sr-90 with a risk of 2E-06. Table 4 summarizes the risks to an inadvertent intruder at the CPP-31 soils area. Note that if additional time is allowed for decay, the predicted risk will be reduced. For example, if the end of institutional control is changed from 2095 to 2125, the risk will be reduced by a factor of two.

Table 4. Risk to an inadvertent intruder drilling an irrigation well into the CPP-31 soils area.

Radionuclide	External Risk	Inhalation Risk	Soil Ingestion Risk	Total Risk
Am-241	2E-08	4E-08	9E-09	7E-08
Cs-137	1E-04	2E-08	3E-07	1E-04
Eu-154	1E-09	2E-13	8E-13	1E-09
Np-237	7E-10	8E-11	2E-11	8E-10
Pu-238	2E-10	2E-07	3E-08	2E-07
Pu-239	1E-10	7E-08	1E-08	8E-08
Pu-240	8E-11	7E-08	1E-08	8E-08
Sr-90	2E-06	2E-07	2E-06	5E-06
Tc-99	1E-12	1E-12	7E-12	9E-12
U-233	2E-11	2E-09	4E-10	2E-09
U-234	9E-12	2E-09	4E-10	2E-09
U-235	3E-09	5E-10	1E-10	4E-09
U-238	3E-10	2E-10	6E-11	5E-10
Total Risk	1E-04	5E-07	3E-06	1E-04

### 3. REFERENCES

- DOE-NE-ID, 2005, "Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Baseline Risk Assessment (Draft)," DOE/NE-ID-11227, Rev. 0, Draft, U.S. Department of Energy Idaho Operations Office, May 2005.
- EPA, 1997, *Exposure Factors Handbook*, EPA/600/P-95/002Fa, U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment, August 1997.
- Maheras, S. J., A. S. Rood, S. O. Magnuson, M. E. Sussman, and R. N. Bhatt, 1997, *Addendum to Radioactive Waste Management Complex Low-Level Waste Radiological Performance Assessment (EGG-WM-8773)*, INEEL/EXT-97-00462, Idaho National Engineering Laboratory, 1997.
- Yu, C., A. J. Zielen, J. J. Cheng, D. J. LePoire, E. Gnanapragasam, S. Kamboj, J. Arnish, A. Wallo III, W. A. Williams, and H. Peterson, 2001, *User's Manual for RESRAD Version 6*, ANL/EAD-4, Environmental Assessment Division Argonne National Laboratory, Argonne, IL, 2001.

## **Appendix A**

### **RESRAD Files**





appx-a-part-1-tankfarm.txt

B-1 <sup>3</sup> TC-99	<sup>3</sup> 8.320E-06 <sup>3</sup>
8.320E-06 <sup>3</sup> DCF2( 17)	
B-1 <sup>3</sup> Th-228+D	<sup>3</sup> 3.454E-01 <sup>3</sup>
3.420E-01 <sup>3</sup> DCF2( 18)	
B-1 <sup>3</sup> Th-229+D	<sup>3</sup> 2.169E+00 <sup>3</sup>
2.150E+00 <sup>3</sup> DCF2( 19)	
B-1 <sup>3</sup> Th-230	<sup>3</sup> 3.260E-01 <sup>3</sup>
3.260E-01 <sup>3</sup> DCF2( 20)	
B-1 <sup>3</sup> Th-232	<sup>3</sup> 1.640E+00 <sup>3</sup>
1.640E+00 <sup>3</sup> DCF2( 21)	
B-1 <sup>3</sup> U-233	<sup>3</sup> 1.350E-01 <sup>3</sup>
1.350E-01 <sup>3</sup> DCF2( 22)	
B-1 <sup>3</sup> U-234	<sup>3</sup> 1.320E-01 <sup>3</sup>
1.320E-01 <sup>3</sup> DCF2( 23)	
B-1 <sup>3</sup> U-235+D	<sup>3</sup> 1.230E-01 <sup>3</sup>
1.230E-01 <sup>3</sup> DCF2( 24)	
B-1 <sup>3</sup> U-236	<sup>3</sup> 1.250E-01 <sup>3</sup>
1.250E-01 <sup>3</sup> DCF2( 25)	
B-1 <sup>3</sup> U-238	<sup>3</sup> 1.180E-01 <sup>3</sup>
1.180E-01 <sup>3</sup> DCF2( 26)	
B-1 <sup>3</sup> U-238+D	<sup>3</sup> 1.180E-01 <sup>3</sup>
1.180E-01 <sup>3</sup> DCF2( 27)	<sup>3</sup>
<sup>3</sup>	<sup>3</sup>
D-1 <sup>3</sup> Dose conversion factors for ingestion, mrem/pCi:	<sup>3</sup>
D-1 <sup>3</sup> AC-227+D	<sup>3</sup> 1.480E-02 <sup>3</sup>
1.410E-02 <sup>3</sup> DCF3( 1)	
D-1 <sup>3</sup> Am-241	<sup>3</sup> 3.640E-03 <sup>3</sup>
3.640E-03 <sup>3</sup> DCF3( 2)	
D-1 <sup>3</sup> Cs-137+D	<sup>3</sup> 5.000E-05 <sup>3</sup>
5.000E-05 <sup>3</sup> DCF3( 3)	
D-1 <sup>3</sup> Eu-154	<sup>3</sup> 9.550E-06 <sup>3</sup>
9.550E-06 <sup>3</sup> DCF3( 4)	
D-1 <sup>3</sup> H-3	<sup>3</sup> 6.400E-08 <sup>3</sup>
6.400E-08 <sup>3</sup> DCF3( 5)	
D-1 <sup>3</sup> Np-237+D	<sup>3</sup> 4.444E-03 <sup>3</sup>
4.440E-03 <sup>3</sup> DCF3( 6)	
D-1 <sup>3</sup> Pa-231	<sup>3</sup> 1.060E-02 <sup>3</sup>
1.060E-02 <sup>3</sup> DCF3( 7)	
D-1 <sup>3</sup> Pb-210+D	<sup>3</sup> 7.276E-03 <sup>3</sup>
5.370E-03 <sup>3</sup> DCF3( 8)	
D-1 <sup>3</sup> Pu-238	<sup>3</sup> 3.200E-03 <sup>3</sup>
3.200E-03 <sup>3</sup> DCF3( 9)	
D-1 <sup>3</sup> Pu-239	<sup>3</sup> 3.540E-03 <sup>3</sup>
3.540E-03 <sup>3</sup> DCF3( 11)	
D-1 <sup>3</sup> Pu-240	<sup>3</sup> 3.540E-03 <sup>3</sup>
3.540E-03 <sup>3</sup> DCF3( 12)	
D-1 <sup>3</sup> Ra-226+D	<sup>3</sup> 1.321E-03 <sup>3</sup>
1.320E-03 <sup>3</sup> DCF3( 14)	
D-1 <sup>3</sup> Ra-228+D	<sup>3</sup> 1.442E-03 <sup>3</sup>
1.440E-03 <sup>3</sup> DCF3( 15)	
D-1 <sup>3</sup> Sr-90+D	<sup>3</sup> 1.528E-04 <sup>3</sup>
1.420E-04 <sup>3</sup> DCF3( 16)	
D-1 <sup>3</sup> TC-99	<sup>3</sup> 1.460E-06 <sup>3</sup>
1.460E-06 <sup>3</sup> DCF3( 17)	
D-1 <sup>3</sup> Th-228+D	<sup>3</sup> 8.086E-04 <sup>3</sup>
3.960E-04 <sup>3</sup> DCF3( 18)	
D-1 <sup>3</sup> Th-229+D	<sup>3</sup> 4.027E-03 <sup>3</sup>
3.530E-03 <sup>3</sup> DCF3( 19)	
D-1 <sup>3</sup> Th-230	<sup>3</sup> 5.480E-04 <sup>3</sup>
5.480E-04 <sup>3</sup> DCF3( 20)	
D-1 <sup>3</sup> Th-232	<sup>3</sup> 2.730E-03 <sup>3</sup>

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2.730E-03 <sup>3</sup> DCF3( 21)  
D-1 <sup>3</sup> U-233 <sup>3</sup> 2.890E-04 <sup>3</sup>  
2.890E-04 <sup>3</sup> DCF3( 22)  
D-1 <sup>3</sup> U-234 <sup>3</sup> 2.830E-04 <sup>3</sup>  
2.830E-04 <sup>3</sup> DCF3( 23)  
D-1 <sup>3</sup> U-235+D <sup>3</sup> 2.673E-04 <sup>3</sup>  
2.660E-04 <sup>3</sup> DCF3( 24)  
1RESRAD, Version 6.3 T« Limit = 180 days 02/28/2006 12:14 Page 3  
Summary : TANKFARM File: TANKFARM.RAD

Dose Conversion Factor (and Related) Parameter Summary

(continued)

File: FGR 13 MORBIDITY

0	Base	Menu	Case*	Parameter	Name	Parameter	Value	Current
AA								
AA								
	D-1			U-236			2.690E-04	
	2.690E-04			DCF3( 25)				
	D-1			U-238			2.550E-04	
	2.550E-04			DCF3( 26)				
	D-1			U-238+D			2.687E-04	
	2.550E-04			DCF3( 27)				
	D-34			Food transfer factors:				
	D-34			AC-227+D	, plant/soil concentration ratio, dimensionless		2.500E-03	
	2.500E-03			RTF( 1,1)				
	D-34			AC-227+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		2.000E-05	
	2.000E-05			RTF( 1,2)				
	D-34			AC-227+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-05	
	2.000E-05			RTF( 1,3)				
	D-34							
	D-34			Am-241	, plant/soil concentration ratio, dimensionless		1.000E-03	
	1.000E-03			RTF( 2,1)				
	D-34			Am-241	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		5.000E-05	
	5.000E-05			RTF( 2,2)				
	D-34			Am-241	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-06	
	2.000E-06			RTF( 2,3)				
	D-34							
	D-34			CS-137+D	, plant/soil concentration ratio, dimensionless		4.000E-02	
	4.000E-02			RTF( 3,1)				
	D-34			CS-137+D	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		3.000E-02	
	3.000E-02			RTF( 3,2)				
	D-34			CS-137+D	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		8.000E-03	
	8.000E-03			RTF( 3,3)				
	D-34							
	D-34			Eu-154	, plant/soil concentration ratio, dimensionless		2.500E-03	
	2.500E-03			RTF( 4,1)				
	D-34			Eu-154	, beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		2.000E-03	
	2.000E-03			RTF( 4,2)				
	D-34			Eu-154	, milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-05	
	5.000E-05			RTF( 4,3)				
	D-34							
	D-34			H-3	, plant/soil concentration ratio, dimensionless		4.800E+00	

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                                appx-a-part-1-tankfarm.txt
4.800E+00 ³ RTF( 5,1)
D-34 ³ H-3      , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.200E-02 ³
1.200E-02 ³ RTF( 5,2)
D-34 ³ H-3      , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 1.000E-02 ³
1.000E-02 ³ RTF( 5,3)
D-34 ³          , plant/soil concentration ratio, dimensionless ³ 2.000E-02 ³
D-34 ³ Np-237+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.000E-03 ³
2.000E-02 ³ RTF( 6,1)
D-34 ³ Np-237+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 5.000E-06 ³
1.000E-03 ³ RTF( 6,2)
D-34 ³ Np-237+D , plant/soil concentration ratio, dimensionless ³ 1.000E-02 ³
5.000E-06 ³ RTF( 6,3)
D-34 ³          , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 5.000E-03 ³
D-34 ³ Pa-231    , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 5.000E-06 ³
1.000E-02 ³ RTF( 7,1)
D-34 ³ Pa-231    , plant/soil concentration ratio, dimensionless ³ 1.000E-02 ³
5.000E-03 ³ RTF( 7,2)
D-34 ³ Pa-231    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 8.000E-04 ³
5.000E-06 ³ RTF( 7,3)
D-34 ³          , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 3.000E-04 ³
D-34 ³ Pb-210+D , plant/soil concentration ratio, dimensionless ³ 1.000E-02 ³
1.000E-02 ³ RTF( 8,1)
D-34 ³ Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.000E-03 ³
8.000E-04 ³ RTF( 8,2)
D-34 ³ Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 1.000E-04 ³
3.000E-04 ³ RTF( 8,3)
D-34 ³          , plant/soil concentration ratio, dimensionless ³ 1.000E-03 ³
D-34 ³ Pu-238    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.000E-04 ³
1.000E-03 ³ RTF( 9,1)
D-34 ³ Pu-238    , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 1.000E-06 ³
1.000E-04 ³ RTF( 9,2)
D-34 ³ Pu-238    , plant/soil concentration ratio, dimensionless ³ 1.000E-03 ³
1.000E-06 ³ RTF( 9,3)
D-34 ³          , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.000E-04 ³
D-34 ³ Pu-239    , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 1.000E-06 ³
1.000E-03 ³ RTF( 11,1)
D-34 ³ Pu-239    , plant/soil concentration ratio, dimensionless ³ 1.000E-03 ³
1.000E-04 ³ RTF( 11,2)
D-34 ³ Pu-239    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.000E-04 ³
1.000E-06 ³ RTF( 11,3)
D-34 ³          , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 1.000E-06 ³
D-34 ³ Pu-240    , plant/soil concentration ratio, dimensionless ³ 1.000E-03 ³
1.000E-03 ³ RTF( 12,1)
D-34 ³ Pu-240    , beef/livestock-intake ratio, (pCi/kg)/(pCi/d) ³ 1.000E-04 ³
1.000E-04 ³ RTF( 12,2)
D-34 ³ Pu-240    , milk/livestock-intake ratio, (pCi/L)/(pCi/d) ³ 1.000E-06 ³
1.000E-06 ³ RTF( 12,3)
D-34 ³          , plant/soil concentration ratio, dimensionless ³ 1.000E-03 ³

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1RESRAD, Version 6.3  
Summary : TANKFARM

T« Limit = 180 days

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File: TANKFARM.RAD

(continued) Dose Conversion Factor (and Related) Parameter Summary

0 ³ File: FGR 13 MORBIDITY ³ Current ³  
Base ³ Parameter

Menu		appx-a-part-1-tankfarm.txt		Value	
Case*	Name	Parameter			
AA					
AA					
D-34	Ra-226+D	plant/soil concentration ratio, dimensionless		4.000E-02	
4.000E-02	RTF( 14,1)				
D-34	Ra-226+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-03	
1.000E-03	RTF( 14,2)				
D-34	Ra-226+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		1.000E-03	
1.000E-03	RTF( 14,3)				
D-34					
D-34	Ra-228+D	plant/soil concentration ratio, dimensionless		4.000E-02	
4.000E-02	RTF( 15,1)				
D-34	Ra-228+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-03	
1.000E-03	RTF( 15,2)				
D-34	Ra-228+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		1.000E-03	
1.000E-03	RTF( 15,3)				
D-34					
D-34	Sr-90+D	plant/soil concentration ratio, dimensionless		3.000E-01	
3.000E-01	RTF( 16,1)				
D-34	Sr-90+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		8.000E-03	
8.000E-03	RTF( 16,2)				
D-34	Sr-90+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		2.000E-03	
2.000E-03	RTF( 16,3)				
D-34					
D-34	Tc-99	plant/soil concentration ratio, dimensionless		5.000E+00	
5.000E+00	RTF( 17,1)				
D-34	Tc-99	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-04	
1.000E-04	RTF( 17,2)				
D-34	Tc-99	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		1.000E-03	
1.000E-03	RTF( 17,3)				
D-34					
D-34	Th-228+D	plant/soil concentration ratio, dimensionless		1.000E-03	
1.000E-03	RTF( 18,1)				
D-34	Th-228+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-04	
1.000E-04	RTF( 18,2)				
D-34	Th-228+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-06	
5.000E-06	RTF( 18,3)				
D-34					
D-34	Th-229+D	plant/soil concentration ratio, dimensionless		1.000E-03	
1.000E-03	RTF( 19,1)				
D-34	Th-229+D	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-04	
1.000E-04	RTF( 19,2)				
D-34	Th-229+D	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-06	
5.000E-06	RTF( 19,3)				
D-34					
D-34	Th-230	plant/soil concentration ratio, dimensionless		1.000E-03	
1.000E-03	RTF( 20,1)				
D-34	Th-230	beef/livestock-intake ratio, (pCi/kg)/(pCi/d)		1.000E-04	
1.000E-04	RTF( 20,2)				
D-34	Th-230	milk/livestock-intake ratio, (pCi/L)/(pCi/d)		5.000E-06	
5.000E-06	RTF( 20,3)				
D-34					
D-34	Th-232	plant/soil concentration ratio, dimensionless		1.000E-03	
1.000E-03	RTF( 21,1)				

```

                                appx-a-part-1-tankfarm.txt
D-34 ³ Th-232      , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 1.000E-04 ³
1.000E-04 ³ RTF( 21,2)
D-34 ³ Th-232      , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 5.000E-06 ³
5.000E-06 ³ RTF( 21,3)
D-34 ³
³
³
D-34 ³ U-233      , plant/soil concentration ratio, dimensionless ³ 2.500E-03 ³
2.500E-03 ³ RTF( 22,1)
D-34 ³ U-233      , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 3.400E-04 ³
3.400E-04 ³ RTF( 22,2)
D-34 ³ U-233      , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 6.000E-04 ³
6.000E-04 ³ RTF( 22,3)
D-34 ³
³
³
D-34 ³ U-234      , plant/soil concentration ratio, dimensionless ³ 2.500E-03 ³
2.500E-03 ³ RTF( 23,1)
D-34 ³ U-234      , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 3.400E-04 ³
3.400E-04 ³ RTF( 23,2)
D-34 ³ U-234      , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 6.000E-04 ³
6.000E-04 ³ RTF( 23,3)
D-34 ³
³
³
D-34 ³ U-235+D    , plant/soil concentration ratio, dimensionless ³ 2.500E-03 ³
2.500E-03 ³ RTF( 24,1)
D-34 ³ U-235+D    , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 3.400E-04 ³
3.400E-04 ³ RTF( 24,2)
D-34 ³ U-235+D    , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 6.000E-04 ³
6.000E-04 ³ RTF( 24,3)
D-34 ³
³
³
D-34 ³ U-236      , plant/soil concentration ratio, dimensionless ³ 2.500E-03 ³
2.500E-03 ³ RTF( 25,1)
D-34 ³ U-236      , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 3.400E-04 ³
3.400E-04 ³ RTF( 25,2)
D-34 ³ U-236      , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 6.000E-04 ³
6.000E-04 ³ RTF( 25,3)
D-34 ³
³
³
D-34 ³ U-238      , plant/soil concentration ratio, dimensionless ³ 2.500E-03 ³
2.500E-03 ³ RTF( 26,1)
D-34 ³ U-238      , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 3.400E-04 ³
3.400E-04 ³ RTF( 26,2)
D-34 ³ U-238      , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 6.000E-04 ³
6.000E-04 ³ RTF( 26,3)
1RESRAD, Version 6.3      T« Limit = 180 days      02/28/2006 12:14 Page 5
Summary : TANKFARM      File: TANKFARM.RAD

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Dose Conversion Factor (and Related) Parameter Summary

(continued)

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                                File: FGR 13 MORBIDITY
0      ³
Base   ³ Parameter
Menu   ³
Case*  ³ Name
³
³
³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
D-34 ³ U-238+D    , plant/soil concentration ratio, dimensionless ³ 2.500E-03 ³
2.500E-03 ³ RTF( 27,1)
D-34 ³ U-238+D    , beef/livestock-intake ratio, (pci/kg)/(pci/d) ³ 3.400E-04 ³
3.400E-04 ³ RTF( 27,2)
D-34 ³ U-238+D    , milk/livestock-intake ratio, (pci/L)/(pci/d) ³ 6.000E-04 ³
6.000E-04 ³ RTF( 27,3)

```

appx-a-part-1-tankfarm.txt			
D-5	Bioaccumulation factors, fresh water, L/kg:		
D-5	Ac-227+D, fish	1.500E+01	
1.500E+01	BIOFAC( 1,1)		
D-5	Ac-227+D, crustacea and mollusks	1.000E+03	
1.000E+03	BIOFAC( 1,2)		
D-5	Am-241, fish	3.000E+01	
3.000E+01	BIOFAC( 2,1)		
D-5	Am-241, crustacea and mollusks	1.000E+03	
1.000E+03	BIOFAC( 2,2)		
D-5	Cs-137+D, fish	2.000E+03	
2.000E+03	BIOFAC( 3,1)		
D-5	Cs-137+D, crustacea and mollusks	1.000E+02	
1.000E+02	BIOFAC( 3,2)		
D-5	Eu-154, fish	5.000E+01	
5.000E+01	BIOFAC( 4,1)		
D-5	Eu-154, crustacea and mollusks	1.000E+03	
1.000E+03	BIOFAC( 4,2)		
D-5	H-3, fish	1.000E+00	
1.000E+00	BIOFAC( 5,1)		
D-5	H-3, crustacea and mollusks	1.000E+00	
1.000E+00	BIOFAC( 5,2)		
D-5	Np-237+D, fish	3.000E+01	
3.000E+01	BIOFAC( 6,1)		
D-5	Np-237+D, crustacea and mollusks	4.000E+02	
4.000E+02	BIOFAC( 6,2)		
D-5	Pa-231, fish	1.000E+01	
1.000E+01	BIOFAC( 7,1)		
D-5	Pa-231, crustacea and mollusks	1.100E+02	
1.100E+02	BIOFAC( 7,2)		
D-5	Pb-210+D, fish	3.000E+02	
3.000E+02	BIOFAC( 8,1)		
D-5	Pb-210+D, crustacea and mollusks	1.000E+02	
1.000E+02	BIOFAC( 8,2)		
D-5	Pu-238, fish	3.000E+01	
3.000E+01	BIOFAC( 9,1)		
D-5	Pu-238, crustacea and mollusks	1.000E+02	
1.000E+02	BIOFAC( 9,2)		
D-5	Pu-239, fish	3.000E+01	
3.000E+01	BIOFAC( 11,1)		
D-5	Pu-239, crustacea and mollusks	1.000E+02	
1.000E+02	BIOFAC( 11,2)		

appx-a-part-1-tankfarm.txt

```

      3
D-5 3 Pu-240 , fish 3 3.000E+01 3
3.000E+01 3 BIOFAC( 12,1)
D-5 3 Pu-240 , crustacea and mollusks 3 1.000E+02 3
1.000E+02 3 BIOFAC( 12,2)
D-5 3
      3
D-5 3 Ra-226+D , fish 3 5.000E+01 3
5.000E+01 3 BIOFAC( 14,1)
D-5 3 Ra-226+D , crustacea and mollusks 3 2.500E+02 3
2.500E+02 3 BIOFAC( 14,2)
D-5 3
      3
D-5 3 Ra-228+D , fish 3 5.000E+01 3
5.000E+01 3 BIOFAC( 15,1)
D-5 3 Ra-228+D , crustacea and mollusks 3 2.500E+02 3
2.500E+02 3 BIOFAC( 15,2)
D-5 3
      3
D-5 3 Sr-90+D , fish 3 6.000E+01 3
6.000E+01 3 BIOFAC( 16,1)
D-5 3 Sr-90+D , crustacea and mollusks 3 1.000E+02 3
1.000E+02 3 BIOFAC( 16,2)
D-5 3
      3
D-5 3 Tc-99 , fish 3 2.000E+01 3
2.000E+01 3 BIOFAC( 17,1)
D-5 3 Tc-99 , crustacea and mollusks 3 5.000E+00 3
5.000E+00 3 BIOFAC( 17,2)
D-5 3
      3

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1RESRAD, Version 6.3  
Summary : TANKFARM

T« Limit = 180 days

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File: TANKFARM.RAD

# Dose Conversion Factor (and Related) Parameter Summary

(continued)

File: FGR 13 MORBIDITY

```

0 3
Base 3 Parameter 3 Current 3
Menu 3 3 value 3
Case* 3 Name
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
D-5 3 Th-228+D , fish 3 1.000E+02 3
1.000E+02 3 BIOFAC( 18,1)
D-5 3 Th-228+D , crustacea and mollusks 3 5.000E+02 3
5.000E+02 3 BIOFAC( 18,2)
D-5 3
      3
D-5 3 Th-229+D , fish 3 1.000E+02 3
1.000E+02 3 BIOFAC( 19,1)
D-5 3 Th-229+D , crustacea and mollusks 3 5.000E+02 3
5.000E+02 3 BIOFAC( 19,2)
D-5 3
      3
D-5 3 Th-230 , fish 3 1.000E+02 3
1.000E+02 3 BIOFAC( 20,1)
D-5 3 Th-230 , crustacea and mollusks 3 5.000E+02 3
5.000E+02 3 BIOFAC( 20,2)
D-5 3
      3
D-5 3 Th-232 , fish 3 1.000E+02 3

```

## Appendix A

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appx-a-part-1-tankfarm.txt
R012 3 Concentration in groundwater (pCi/L): Pu-238 3 not used 3 0.000E+00 3
      3 --- 3 w1( 9)
R012 3 Concentration in groundwater (pCi/L): Pu-239 3 not used 3 0.000E+00 3
      3 --- 3 w1(11)
R012 3 Concentration in groundwater (pCi/L): Pu-240 3 not used 3 0.000E+00 3
      3 --- 3 w1(12)
R012 3 Concentration in groundwater (pCi/L): Sr-90 3 not used 3 0.000E+00 3
      3 --- 3 w1(16)
R012 3 Concentration in groundwater (pCi/L): Tc-99 3 not used 3 0.000E+00 3
      3 --- 3 w1(17)
R012 3 Concentration in groundwater (pCi/L): U-233 3 not used 3 0.000E+00 3
      3 --- 3 w1(22)
R012 3 Concentration in groundwater (pCi/L): U-234 3 not used 3 0.000E+00 3
      3 --- 3 w1(23)
R012 3 Concentration in groundwater (pCi/L): U-235 3 not used 3 0.000E+00 3
      3 --- 3 w1(24)
R012 3 Concentration in groundwater (pCi/L): U-238 3 not used 3 0.000E+00 3
      3 --- 3 w1(26)
      3
R013 3 Cover depth (m) 3 0.000E+00 3 0.000E+00 3
      3 --- 3 COVER0
R013 3 Density of cover material (g/cm**3) 3 not used 3 1.500E+00 3
      3 --- 3 DENS CV
R013 3 Cover depth erosion rate (m/yr) 3 not used 3 1.000E-03 3
      3 --- 3 VCV
R013 3 Density of contaminated zone (g/cm**3) 3 1.500E+00 3 1.500E+00 3
      3 --- 3 DENS CZ
R013 3 Contaminated zone erosion rate (m/yr) 3 0.000E+00 3 1.000E-03 3
      3 --- 3 VCZ
1RESRAD, Version 6.3 T< Limit = 180 days 02/28/2006 12:14 Page 8
Summary : TANKFARM File: TANKFARM.RAD

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(continued)

#### Site-Specific Parameter Summary

0	Used by RESRAD	Parameter	User	Default
Menu	Parameter	Name	Input	Default
(If different from user input)				
AA				
R013	Contaminated zone total porosity	TPCZ	4.000E-01	4.000E-01
R013	Contaminated zone field capacity	FCCZ	2.000E-01	2.000E-01
R013	Contaminated zone hydraulic conductivity (m/yr)	HCCZ	1.000E+01	1.000E+01
R013	Contaminated zone b parameter	BCZ	5.300E+00	5.300E+00
R013	Average annual wind speed (m/sec)	WIND	3.350E+00	2.000E+00
R013	Humidity in air (g/m**3)	HUMID	3.500E-01	8.000E+00
R013	Evapotranspiration coefficient	EVAPTR	5.000E-01	5.000E-01
R013	Precipitation (m/yr)	PRECIP	2.212E-01	1.000E+00
R013	Irrigation (m/yr)	RI	2.000E-01	2.000E-01
R013	Irrigation mode	IDITCH	overhead	overhead
R013	Runoff coefficient		2.000E-01	2.000E-01

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                                appx-a-part-1-tankfarm.txt
                                3 RUNOFF
R013 3 Watershed area for nearby stream or pond (m**2) 3 not used 3 1.000E+06 3
                                3 WAREA
R013 3 Accuracy for water/soil computations 3 not used 3 1.000E-03 3
                                3 EPS
                                3
                                3
R014 3 Density of saturated zone (g/cm**3) 3 not used 3 1.500E+00 3
                                3 DENSAQ
R014 3 Saturated zone total porosity 3 not used 3 4.000E-01 3
                                3 TPSZ
R014 3 Saturated zone effective porosity 3 not used 3 2.000E-01 3
                                3 EPSZ
R014 3 Saturated zone field capacity 3 not used 3 2.000E-01 3
                                3 FCSZ
R014 3 Saturated zone hydraulic conductivity (m/yr) 3 not used 3 1.000E+02 3
                                3 HCSZ
R014 3 Saturated zone hydraulic gradient 3 not used 3 2.000E-02 3
                                3 HGWT
R014 3 Saturated zone b parameter 3 not used 3 5.300E+00 3
                                3 BSZ
R014 3 Water table drop rate (m/yr) 3 not used 3 1.000E-03 3
                                3 VWT
R014 3 Well pump intake depth (m below water table) 3 not used 3 1.000E+01 3
                                3 DWIBWT
R014 3 Model: Nondispersion (ND) or Mass-Balance (MB) 3 not used 3 ND 3
                                3 MODEL
R014 3 Well pumping rate (m**3/yr) 3 not used 3 2.500E+02 3
                                3 UW
                                3
                                3
R015 3 Number of unsaturated zone strata 3 not used 3 1 3
                                3 NS
R015 3 Unsat. zone 1, thickness (m) 3 not used 3 4.000E+00 3
                                3 H(1)
R015 3 Unsat. zone 1, soil density (g/cm**3) 3 not used 3 1.500E+00 3
                                3 DENSUZ(1)
R015 3 Unsat. zone 1, total porosity 3 not used 3 4.000E-01 3
                                3 TPUZ(1)
R015 3 Unsat. zone 1, effective porosity 3 not used 3 2.000E-01 3
                                3 EPUZ(1)
R015 3 Unsat. zone 1, field capacity 3 not used 3 2.000E-01 3
                                3 FCUZ(1)
R015 3 Unsat. zone 1, soil-specific b parameter 3 not used 3 5.300E+00 3
                                3 BUZ(1)
R015 3 Unsat. zone 1, hydraulic conductivity (m/yr) 3 not used 3 1.000E+01 3
                                3 HCUZ(1)
                                3
                                3
R016 3 Distribution coefficients for Ac-227 3 3 3
                                3
R016 3 Contaminated zone (cm**3/g) 3 2.000E+01 3 2.000E+01 3
                                3 DCNUCC( 1)
R016 3 Unsaturated zone 1 (cm**3/g) 3 not used 3 2.000E+01 3
                                3 DCNUCU( 1,1)
R016 3 Saturated zone (cm**3/g) 3 not used 3 2.000E+01 3
                                3 DCNUCS( 1)
R016 3 Leach rate (/yr) 3 1.000E-30 3 0.000E+00 3
                                3 ALEACH( 1)
R016 3 Solubility constant 3 0.000E+00 3 0.000E+00 3
                                3 SOLUBK( 1)
                                3
                                3

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                                appx-a-part-1-tankfarm.txt
R016 3 Distribution coefficients for Am-241          3          3          3
R016 3 Contaminated zone (cm**3/g)                3 2.000E+01 3 2.000E+01 3
      7.853E+30          3 DCNUCC( 2)
R016 3 Unsaturated zone 1 (cm**3/g)                3 not used 3 2.000E+01 3
      ---          3 DCNUCU( 2,1)
R016 3 Saturated zone (cm**3/g)                    3 not used 3 2.000E+01 3
      ---          3 DCNUCS( 2)
R016 3 Leach rate (/yr)                            3 1.000E-30 3 0.000E+00 3
      ---          3 ALEACH( 2)
R016 3 Solubility constant                          3 0.000E+00 3 0.000E+00 3
      not used          3 SOLUBK( 2)
IRESRAD, Version 6.3      T« Limit = 180 days      02/28/2006 12:14 Page 9
Summary : TANKFARM                                           File: TANKFARM.RAD

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                                Site-Specific Parameter Summary
(continued)
0          3          3          3          3
      Used by RESRAD          3 Parameter
Menu          3          3          3          3
(If different from user input) 3 Name
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
R016 3 Distribution coefficients for Cs-137          3          3          3
R016 3 Contaminated zone (cm**3/g)                3 4.600E+03 3 4.600E+03 3
      7.853E+30          3 DCNUCC( 3)
R016 3 Unsaturated zone 1 (cm**3/g)                3 not used 3 4.600E+03 3
      ---          3 DCNUCU( 3,1)
R016 3 Saturated zone (cm**3/g)                    3 not used 3 4.600E+03 3
      ---          3 DCNUCS( 3)
R016 3 Leach rate (/yr)                            3 1.000E-30 3 0.000E+00 3
      ---          3 ALEACH( 3)
R016 3 Solubility constant                          3 0.000E+00 3 0.000E+00 3
      not used          3 SOLUBK( 3)
      3          3          3
R016 3 Distribution coefficients for Eu-154          3          3          3
R016 3 Contaminated zone (cm**3/g)                3 -1.000E+00 3 -1.000E+00 3
      7.853E+30          3 DCNUCC( 4)
R016 3 Unsaturated zone 1 (cm**3/g)                3 not used 3 -1.000E+00 3
      ---          3 DCNUCU( 4,1)
R016 3 Saturated zone (cm**3/g)                    3 not used 3 -1.000E+00 3
      ---          3 DCNUCS( 4)
R016 3 Leach rate (/yr)                            3 1.000E-30 3 0.000E+00 3
      ---          3 ALEACH( 4)
R016 3 Solubility constant                          3 0.000E+00 3 0.000E+00 3
      not used          3 SOLUBK( 4)
      3          3          3
R016 3 Distribution coefficients for H-3            3          3          3
R016 3 Contaminated zone (cm**3/g)                3 0.000E+00 3 0.000E+00 3
      7.853E+30          3 DCNUCC( 5)
R016 3 Unsaturated zone 1 (cm**3/g)                3 not used 3 0.000E+00 3
      ---          3 DCNUCU( 5,1)
R016 3 Saturated zone (cm**3/g)                    3 not used 3 0.000E+00 3
      ---          3 DCNUCS( 5)
R016 3 Leach rate (/yr)                            3 1.000E-30 3 0.000E+00 3
      ---          3 ALEACH( 5)
R016 3 Solubility constant                          3 0.000E+00 3 0.000E+00 3

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                                appx-a-part-1-tankfarm.txt
      not used                    3 SOLUBK( 5)
3
3
3
R016 3 Distribution coefficients for Np-237
3
3
3
R016 3 Contaminated zone (cm**3/g)
3 7.853E+30 3 DCNUCC( 6) 3 -1.000E+00 3 -1.000E+00 3
R016 3 Unsaturated zone 1 (cm**3/g)
3 --- 3 DCNUCU( 6,1) 3 not used 3 -1.000E+00 3
R016 3 Saturated zone (cm**3/g)
3 --- 3 DCNUCS( 6) 3 not used 3 -1.000E+00 3
R016 3 Leach rate (/yr)
3 --- 3 ALEACH( 6) 3 1.000E-30 3 0.000E+00 3
R016 3 Solubility constant
3 not used 3 SOLUBK( 6) 3 0.000E+00 3 0.000E+00 3
3
3
3
R016 3 Distribution coefficients for Pu-238
3
3
3
R016 3 Contaminated zone (cm**3/g)
3 7.853E+30 3 DCNUCC( 9) 3 2.000E+03 3 2.000E+03 3
R016 3 Unsaturated zone 1 (cm**3/g)
3 --- 3 DCNUCU( 9,1) 3 not used 3 2.000E+03 3
R016 3 Saturated zone (cm**3/g)
3 --- 3 DCNUCS( 9) 3 not used 3 2.000E+03 3
R016 3 Leach rate (/yr)
3 --- 3 ALEACH( 9) 3 1.000E-30 3 0.000E+00 3
R016 3 Solubility constant
3 not used 3 SOLUBK( 9) 3 0.000E+00 3 0.000E+00 3
3
3
3
R016 3 Distribution coefficients for Pu-239
3
3
3
R016 3 Contaminated zone (cm**3/g)
3 --- 3 DCNUCC(11) 3 2.000E+03 3 2.000E+03 3
R016 3 Unsaturated zone 1 (cm**3/g)
3 --- 3 DCNUCU(11,1) 3 not used 3 2.000E+03 3
R016 3 Saturated zone (cm**3/g)
3 --- 3 DCNUCS(11) 3 not used 3 2.000E+03 3
R016 3 Leach rate (/yr)
3 3.926E-03 3 ALEACH(11) 3 1.000E+30 3 0.000E+00 3
R016 3 Solubility constant
3 not used 3 SOLUBK(11) 3 0.000E+00 3 0.000E+00 3
3
3
3
R016 3 Distribution coefficients for Pu-240
3
3
3
R016 3 Contaminated zone (cm**3/g)
3 7.853E+30 3 DCNUCC(12) 3 2.000E+03 3 2.000E+03 3
R016 3 Unsaturated zone 1 (cm**3/g)
3 --- 3 DCNUCU(12,1) 3 not used 3 2.000E+03 3
R016 3 Saturated zone (cm**3/g)
3 --- 3 DCNUCS(12) 3 not used 3 2.000E+03 3
R016 3 Leach rate (/yr)
3 --- 3 ALEACH(12) 3 1.000E-30 3 0.000E+00 3
R016 3 Solubility constant
3 not used 3 SOLUBK(12) 3 0.000E+00 3 0.000E+00 3
1RESRAD, Version 6.3 T« Limit = 180 days 02/28/2006 12:14 Page 10
Summary : TANKFARM File: TANKFARM.RAD

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(continued)  
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Site-Specific Parameter Summary

3 User 3 3